

Jet Propulsion Laboratory
California Institute of Technology

**Report on
AAS “Meeting-in-Meeting”
Boston MA, June 3-4, 2014**

***On the Shoulders of Giants:
Planets Beyond the Reach of Kepler***

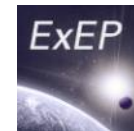
Organizer:

Steve Unwin

Jet Propulsion Laboratory, California Institute of Technology

AFTA SDT Meeting, Columbia, MD, July 29-30, 2014

Meeting Objectives



ExoPlanet Exploration Program

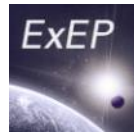
- Scientific objectives:
 - Review the theoretical reasons why we need to study planets beyond 1 AU
 - Integrate what we learn from those interior to 1 AU
 - Review what we know now from current experiments, and what we still need to know
 - Look to the future to see what opportunities there are in the near and further future, including AFTA (and Probes)
- Programmatic objectives:
 - Increase community awareness and support for the exoplanet science objectives of AFTA
 - Provide an opportunity for input to the AFTA science program, for the *Final Report* due in January 2015

Meeting-in-Meeting SOC



ExoPlanet Exploration Program

- Stephen Unwin (JPL, Chair)
- David Spergel (Princeton)
- Neil Gehrels (NASA GSFC)
- Scott Gaudi (OSU)
- Jeremy Kasdin (Princeton)
- David Bennett (Notre Dame)
- Bruce Macintosh (LLNL, now at Stanford)
- Tom Greene (NASA Ames)



Session Descriptions: Four 90-minute Sessions

ExoPlanet Exploration Program

- **Session I** *What we know today and what we would like to learn*
 - Introduction; current state of theoretical understanding of planets in long orbits - beyond the reach of Kepler
- **Session II** *Demographics*
 - Demographics of the exoplanet population, based on what we know from RV surveys, Kepler, and microlensing
- **Session III** *Ground-based Imaging and Spectroscopy*
 - Direct observation of exoplanets with imaging and spectroscopy, and what we learn from debris-disks around planet-bearing stars
- **Session IV** *The Near Future*
 - What we can expect to learn about this planet population in the near future. In addition to TESS and JWST under development, we also discuss the contributions of AFTA-WFIRST through microlensing and spectroscopy, and the exoplanet Probes

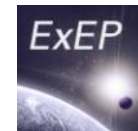
Timeline



ExoPlanet Exploration Program

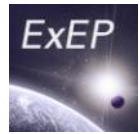
- October 2013: Several telecons with SOC to establish scope
- November 2013: Session outline submitted to AAS
- January 2014: Session approved by AAS
- Jan-Feb 2014: Invitations, acceptances, rejections, more invitations, more rejections, more invitations
- February 2014: Confirmed speaker names to AAS; chasing down stragglers
- March 2014: Abstracts due to AAS; more chasing down stragglers
- April 2014: Travel support (only 2 speakers needed support)
- May 2014: Logistics details with AAS
- June 2014: 'Meeting in Meeting'

How did it go?



ExoPlanet Exploration Program

- We had a total of 24 talks
 - 20 invited; 4 contributed
 - No poster session (too few posters submitted)
- Scheduled in the largest conference room
- A/V support from the AAS was excellent
- Each session ran in parallel with 5 other sessions
- Excellent attendance !
 - Session 1: ~150 people
 - Session 2: ~90 people
 - Session 3: ~80 people
 - Session 4: ~140 people



Presentations on website

ExoPlanet Exploration Program

The screenshot shows the ExoPlanet Exploration Program website. The header includes the NASA Jet Propulsion Laboratory logo and navigation links for JPL HOME, EARTH, SOLAR SYSTEM, STARS & GALAXIES, and SCIENCE & TECHNOLOGY. The main content area is titled 'EXOPLANET EXPLORATION PROGRAM' and features a sidebar with links to Home, News, Events, Program Overview, K2, WFIRST, Kepler, NExSci, Presentations, ExoPAG, Science and Technology Definition Teams, Technology, Newsletter, Documents, Research Opportunities, and Links. The 'Presentations' section is highlighted, showing a list of talks under the heading 'On the Shoulders of Giants: Planets Beyond the Reach of Kepler'. The talks are organized into four sessions: Planets Beyond the Reach of Kepler I: What We Know Today and What We Would Like to Learn, Planets Beyond the Reach of Kepler II: Demographics, Planets Beyond the Reach of Kepler III: Ground-based Imaging and Spectroscopy, and Planets Beyond the Reach of Kepler IV: The Near Future. Each session lists several talks with their titles and speakers. The footer includes a privacy/copyright notice and contact information for the site manager and curator.

On the Shoulders of Giants: Planets Beyond the Reach of Kepler

Meeting-in-Meeting held at the 224th Meeting of the American Astronomical Society, in Boston MA, June 3-4, 2014.

What kind of planets lie at orbit radii of 1-2 AU - beyond the reach of Kepler? In the last two decades we have explored a sample of RV-detected planets, discovered distant planets with microlensing, and several hot young planets at large radii have been detected by direct imaging, as well as the debris disks that provide clues to formation and evolution. In these 4 sessions, we explore the near future, and how we can expect to learn much more about the demographics and properties of cold outer planets. AFTA-WFIRST will open up this area, with a microlensing survey to probe the population of long-orbit planets, and coronagraphy to take images and spectra of large planets in orbits at a few AU. NASA also has probe-scale mission concepts under study for direct imaging and spectroscopy of exoplanets.

Planets Beyond the Reach of Kepler I: What We Know Today and What We Would Like to Learn

Planets Beyond the Reach of Kepler - Introduction - S. Unwin, NASA JPL
Studying Extrasolar Planets with WFIRST - D.N. Spergel, Princeton
Theory of giant planet atmospheres and spectra - A. Burrows, Princeton
Observed & Predicted Debris Disks Structures Beyond the Reach of Kepler - C. Stark, NASA-GSFC
Theoretical Albedo Spectra of Exoplanet Direct Imaging Targets - N. Lewis, MIT

Planets Beyond the Reach of Kepler II: Demographics

Demographics of Giant Planets—Insights from Theory - R. Murray-Clay, CIA
Characterizing Cold Giant Planets in Reflected Light: Lessons from 50 Years of Outer Solar System Observation and Exploration - M. S. Marley, NASA Ames
The Occurrence Rate of Giant Planets around M-dwarf Stars - J.R. Crepp, U Notre Dame
Planet frequency beyond the snow line from MOA-II microlensing survey - D. Suzuki, Osaka University
Free-floating planets from microlensing - T. Sumi, Osaka University

Planets Beyond the Reach of Kepler III: Ground-based Imaging and Spectroscopy

Detecting and Characterizing Exoplanets with Direct Imaging from the Ground - B. Biller, U Edinburgh
The Gemini Planet Imager - B. Macintosh, Lawrence Livermore National Laboratory
Direct Imaging of Exoplanets and Their Forming Disks with the Subaru Telescope - M. Tamura, University of Tokyo
Tracing Planetary System Architecture with Debris Disk Imaging - G. Bryden, NASA-JPL
Pushing the radial velocity accuracy of HARPS and HARPS-N - X. Dumusque, CIA
First science results from the K2 mission - T. Barclay, NASA Ames

Planets Beyond the Reach of Kepler IV: The Near Future

Overview of WFIRST-AFTA Mission Capabilities - N. Gehrels, NASA-GSFC
Mass Measurements for Microlens Planets with WFIRST-AFTA - J.C. Yee, CIA
WFIRST-AFTA: What Can We Learn by Detecting Thousands of Cold Exoplanets via Microlensing? - M. Penny, Ohio State University
Capabilities of WFIRST-AFTA for coronagraphic imaging of exoplanets - W. A. Traub, NASA JPL
Observing Other Worlds With JWST - C. A. Beichman, NExSci
Exo-S: A Probe-scale Space Mission to Directly Image and Spectroscopically Characterize Exoplanetary Systems
Using a Starshade and Telescope System - S. Seager, MIT
Exo-C: A probe-scale space mission to directly image and spectroscopically characterize exoplanetary systems using an internal coronagraph - K. R. Stapelfeldt, NASA-GSFC

We have PDFs of almost all the talks on the ExEP website, sorted by session

<http://exep.jpl.nasa.gov/presentations/giantsSession/>



Lessons Learned 1

- Meeting objectives were very clearly stated at the outset
 - This greatly helped with invitations, acceptances, rejections
 - Avoided having shifting goals based on responses
- Even a simple meeting like this AAS ‘Meeting in Meeting’ requires a lead time of ~7-8 months
- Pester prospective speakers relentlessly!
 - It only gets harder to adapt later, if you get rejections
- Don’t over-schedule
 - We consciously went for breadth over depth
 - But this could have been accomplished with fewer speakers, each with a broader charter
 - Considerable frustration from some speakers:
 - A 15-minute *invited* talk is pretty short! Some even had to be *10 minutes*



Lessons Learned 2

- Once published, the AAS schedule cannot be changed, no matter how hard you try
 - Schedule was frozen in late March
- Balance between the sessions was a headache
 - Session 3 (ground based) had too many short talks
- Contributed talks were very hard to deal with
 - Either have no contributed talks, or
 - Allow plenty of time to schedule lots
- Make a database of invitations and keep it up to date
 - Essential to managing the detail: changing institutions and email addresses, changing talk titles and durations, session building, etc.
- Arguing with the SOC over the session title was lots of fun, but very time consuming!

Backup



ExoPlanet Exploration Program

Meeting Description in AAS Program



ExoPlanet Exploration Program

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